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#### **U.S. PATENT DOCUMENTS**

EXAMINER'S INITIALS	PATENT NO.	DATE	NAME	CLASS	SUBCLASS	FILING DATE
	4,812,962	3/14/1989	Witt	364	490	4/9/1987
	5,051,598	9/24/1991	Ashton, et al.	250	492.2	9/12/1990
	5,182,718	1/26/1993	Harafuji, et al.	364	490	3/29/1990
	5,241,185	8/31/1993	Meiri, et al.	250	492.2	1/8/1992
	5,242,770	9/7/1993	Chen, et al.	430	5	1/16/1992
	5,256,505	10/26/1993	Chen, et al.	430	5	8/21/1992
	5,282,140	1/25/1994	Tazawa, et al.	364	468	6/24/1992
	5,316,878	5/31/1994	Saito, et al.	430	5	6/4/1992
	5,326,659	7/5/1994	Liu, et al.	430	5	3/5/1992
	5,340,700	8/23/1994	Chen, et al.	430	312	11/3/1993
	5,424,154	6/13/1995	Borodovsky	430	5	12/10/1993
	5,432,714	7/11/1995	Chung, et al.	364	525	9/2/1994
	5,447,810	9/5/1995	Chen, et al.	430	5	2/9/1994
	5,532,090	7/2/1996	Borodovsky	430	5	3/1/1995
	5,533,148	7/2/1996	Sayah, et al.	382	240	9/30/1993
	5,538,815	7/23/1996	Oi, et al.	430	5	9/14/1993
	5,553,273	9/3/1996	Liebmann	395	500	4/17/1995
	5,553,274	9/3/1996	Liebmann	395	500	6/6/1995
	5,572,598	11/5/1996	Wihl, et al.	382	144	2/25/1994
	5,631,110	5/20/1997	Shioiri, et al.	430	5	6/5/1995
	5,657,235	8/12/1997	Liebmann, et al.	364	474.24	5/3/1995
	5,663,017	9/2/1997	Schinella, et al.	430	5	6/7/1995
<u> </u>	5,663,893	9/2/1997	Wampler, et al.	364	491	5/3/1995

EXAMINER:	Date Considered:	_

**PTO-1449** 

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NTI-703CIP3

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**Filing Date** 

Group

2825

#### **U.S. PATENT DOCUMENTS**

EXAMINER'S INITIALS	PATENT NO.	DATE	NAME	CLASS	SUBCLASS	FILING DATE
	5,702,848	12/30/1997	Spence	430	5	8/23/1996
	5,705,301	1/6/1998	Garza, et al.	430	5	2/27/1996
<del></del>	5,707,765	1/13/1998	Chen	430	5	5/28/1996
	5,740,068	4/14/1998	Liebmann, et al.	364	489	5/30/1996
	5,795,688	8/18/1998	Burdorf, et al.	430	30	8/14/1996
	5,801,954	9/1/1998	Le, et al.	364	488	4/24/1996
	5,804,340	9/8/1998	Garza, et al.	430	5	12/23/1996
	5,815,685	9/29/1998	Kamon	395	500	9/15/1995
	5,825,647	10/20/1998	Tsudaka	364	167.03	3/12/1996
	5,827,623	10/27/1998	Ishida, et al.	430	5	10/30/1996
	5,847,959	12/8/1998	Veneklasen, et al.	364	468.28	1/28/1997
	5,849,440	12/15/1998	Lucase, et al.	430	5	1/29/1997
	5,862,058	1/19/1999	Samuels, et al.	364	491	5/16/1996
	5,863,682	1/26/1999	Abe, et al.	430	30	2/21/1997
	5,879,844	3/9/1999	Yamamoto, et al.	430	30	12/20/1996
	5,900,338	5/4/1999	Garza, et al.	430	5	8/15/1997
	5,923,566	6/13/1999	Galan, et al.	364	489	3/25/1997
	5,972,541	10/26/1999	Sugasawara, et al.	430	5	3/4/1998
	6,009,250	12/28/1999	Ho, et al.	395	500.06	9/30/1997
	6,009,251	12/28/1999	Ho, et al.	395	500.06	9/30/1997
	6,011,911	1/4/2000	Ho, et al.	395	500.06	9/30/1997
	6,016,357	1/18/2000	Neary, et al.	382	144	6/16/1997
	6,076,465	6/20/2000	Vacca, et al.	101	481	9/19/1997

EXAMINER:	Date Considered:	
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#### Serial No. Atty. Docket No. NTI-703CIP3 INFORMATION DISCLOSURE **CITATION Applicant** PANG, Linyong PTO-1449 Group Filing Date 2825 **U.S. PATENT DOCUMENTS** SUBCLASS FILING CLASS NAME PATENT NO. DATE **EXAMINER'S** DATE INITIALS 1/29/1999 716 19 Yamamoto, et al. 6,077,310 · 6/20/2000 395 500.22 5/8/1997 Garza, et al. 6,078,738 6/20/2000 395 500.22 12/31/1997 6/27/2000 Rieger, et al. 6,081,658 500.22 4/26/1999 395 Garza, et al. 6/27/2000 6,081,659 8/28/1997 401 10/10/2000 Ausschnitt, et al. 356 6,130,750 1/20/1999 5 430 1/9/2001 Medvedeva, et al. 6,171,731 B1 12/12/1995 19 716 Liebmann 2/6/2001 6,185,727 B1 703 6 8/7/1998 2/14/2002 Chang, et al. 2002/0019729 A1

Chang, et al.

EXAMINER:	Date Considered:	

3/21/2002

2002/0035461 A1

7/16/2001

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INFORMATION DISCLOSURE CITATION PTO-1449		Atty. Docket No. NTI-703CIP3  Applicant PANG, Linyong  Filing Date	Serial Group 28				
	,	FO	REIGN PATENT DOCU	MENTS			
EXAMINER'S INITIALS	PATENT NO.	DATE	COUNTRY	CLASS	SUBCLASS	TRANSI YES	ATION NO
	WO 00/36525 A2	6/22/2000	wo				
	WO 00/67074 A1	11/9/2000	wo				
	WO 00/67075 A1	11/9/2000	wo				
	WO 00/67076 A1	11/9/2000	wo				
	EP 0 698 821 A1	2/28/1996	EP				
	WO 97/13370 A1	4/10/1997	wo				
	WO 97/38381 A1 🗸	10/16/1997	wo				
	WO 98/20327 A1 V	5/14/1998	wo				
	WO 98/45685 A1	10/15/1998	wo				
	WO 99/14706 A2/A3	3/25/1999	wo				

Date Considered:

**EXAMINER:** 

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NTI-703CIP3

Applicant

PANG, Linyong

**Filing Date** 

Group

	OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)
EXAMINER'S INITIALS	CITATION
	Lithas, "Lithas: Optical Proximity Correction Software" (2 pages).
_	Microunity, "OPC Technology & Product Description", MicroUnity Systems Engineering, Inc., pp. 1-5.
	Precim, "Proxima System", Precim Company, Portland, Oregon (2 pages).
	Precim, "Proxima Wafer Proximity Correction System", Precim Company, Portland, Oregon (2 pages).
	Rieger, M., et al., "Mask Fabrication Rules for Proximity-Corrected Patterns", Precim Company, Portland, Oregon (10 pages).
	Rieger, M., et al., "Using Behavior Modeling for Proximity Correction", Precim Company, Portland, Oregon (6 pages).
	Spence, C., et al., "Detection of 60(degree) Phase Defects on Alternating PSMs", Advanced Micro Devices, KLA-Tencor, DuPont RTC (2 pages).
	Stirniman, J., et al., "Spatial Filter Models to Describe IC Lithographic Behavior", Precim Corporation, Portland, Oregon (10 pages).
	Sugawara, M., et al., "Defect Printability Study of Attenuated Phase-Shifting Masks for Specifying Inspection Sensitivity", Sony Corporation, Kanagawa, Japan (16 pages).
·	Cobb, et al., "Fast Sparse Aerial Image Calculation for OPC", SPIE, Vol. 2621, pp. 534-544, September 20-22, 1995.
	Ogawa, K., et al., "Phase Defect Inspection by Differential Interference", Lasertec Corporation (12 pages).
	Kang, D., et al., "Effects of Mask Bias on t he Mask Error Enhancement Factor (MEEF) of Contact Holes" (11 pages).
	Socha, R., et al., "Printability of Phase-Shift Defects Using a Perturbational Model", Univ. of California Berkeley, Sematech (11 pages).
	Adam, K., et al., "Simplified Models for Edge Transitions in Rigorous Mask Modeling", University of California Berkeley (40 pages).

EXAMINER:	Date Considered:	
-----------	------------------	--

PTO-1449

Atty. Docket No.

Serial No.

NTI-703CIP3

**Applicant** 

PANG, Linyong

**Filing Date** 

Group

_	OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)
EXAMINER'S INITIALS	CITATION
	Gordon, R., et al., "Mask Topography Simulation for EUV Lithography", FINLE Technologies Inc. (15 pages).
	Pistor, T., "Rigorous 3D Simulation of Phase Defects in Alternating Phase-Shifting Masks", Panoramic Technology Inc. (13 pages).
	Semmier, A., et al., "Application of 3D EMF Simulation for Development and Optimization of Alternating Phase Shifting Masks", Infineon Technologies AG (12 pages).
	Wong, A., et al., "Polarization Effects in Mask Transmission", University of California Berkeley (8 pages).
	Erdmann, A., "Topography Effects and Wave Aberrations in Advanced PSM-Technology", Fraunhofer Institute of Integrated Circuits (11 pages).
	Fiekowsky, P., "The End of Thresholds: Subwavelength Optical Linewidth Measurement Using the Flux-Area Technique", Automated Visual Inspection (6 pages).
	Nguyen, K., et al., "Printability of Substrate and Absorber Defects on Extreme Ultraviolet Lithographic Masks", Sandia National Labs, AT&T Bell Labs (18 pages).
	Neureuther, A., et al., "Modeling Defect-Feature Interactions in the Presence of Aberrations", University of California Berkeley (10 pages).
	Casey, Jr., J.D., et al., "Chemically Enhanced FIB Repair of Opaque Defects on Molybdenum Silicide Photomasks", SPIE, Vol. 3236, pp. 487-497 (1997).
	Trans Vector, "Now Better Quality Photomasks", Trans Vector Technologies, Inc., Camarillo, California (4 pages).
	Mathur, B.P., et al., "Quantitative Evaluation of Shape of Image on Photoresist of Square Apertures", IEEE, Transactions On Electron Devices, Vol. 35, No. 3, pp. 294-297, March 1988.
	Jinbo, H., et al., "0.2um or Less i-Line Lithography by Phase-Shifting-Mask Technology", IEEE, pp. 33.3.1-33.3.4 (1990).
	Neureuther, A., "Modeling Phase Shifting Masks", SPIE, 10th Annual Symposium On Microlithography, Vol. 1496, pp. 80-85 (1990).
	Henke, W., et al., "A Study of Reticle Defects Imaged Into Three-Dimensional Developed Profiles of Positive Photoresist Using the Solid Lithography Simulator", Microelectronics Eng., Vol. 14, pp. 283-297 (1991).

EXAMINER:	Date Considered:	

PTO-1449

Atty. Docket No.

Serial No.

NTI-703CIP3

**Applicant** 

PANG, Linyong

**Filing Date** 

Group

•	OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)
XAMINER'S INITIALS	CITATION
	Jinbo, H., et al., "Improvement of Phase-Shifter Edge Line Mask Method", Japanese Journal Of Applied Physics, Vol. 30, No. 11B, pp. 2998-3003, November 1991.
	Kimura, T., et al., "Subhalf-Micron Gate GaAs Mesfet Process Using Phase-Shifting-Mask Technology", IEEE, GaAs IC Symposium, pp. 281-284 (1991).
	Wiley, J., et al., "Phase Shift Mask Pattern Accuracy Requirements and Inspection Technology", SPIE, Integrated Circuit Metrology, Inspection, And Process Control V, Vol. 1464, pp. 346-355 (1991).
	Fu, C.C., et al., "Enhancement of Lithographic Patterns by Using Serif Features", IEEE, Transactions On Electron Devices, Vol. 38, No. 12, pp. 2599-2603, December 1991.
	Watanabe, H., et al., "Detection and Printability of Shifter Defects in Phase-Shifting Masks", Japanese Journal of Applied Physics, Vol. 30, No. 11B, pp. 3016-3020, November 1991.
	Ham, Y.M., et al., "Dependence of Defects in Optical Lithography", Jpn. J. Appl. Phys., Vol. 31, pp. 4137-4142 (1992).
	Jinbo, H., et al., "Application of Blind Method to Phase-Shifting Lithography", IEEE, 1992 Symposium On VLSI Technology Digest Of Technical Papers, pp. 112-113 (1992).
	Ohtsuka, H., et al., "Phase Defect Repair Method for Alternating Phase Shift Masks Conjugate Twin-Shifter Method", Jpn. J. Appl. Phys., Vol. 31, pp. 4143-4149 (1992).
	Watanabe, H., et al., "Detection and Printability of Shifter Defects in Phase-Shifting Masks II Defocus Characteristics", Jpn. J. Appl. Phys., Vol. 31, pp. 4155-4160 (1992).
	Crisalle, O., et al., "A Comparison of the Optical Projection Lithography Simulators in SAMPLE and PROLITH", IEEE, Transactions On Semiconductor Manufacturing, Vol. 5, No. 1, pp. 14-26, February 1992.
	Rothschild, M., et al., "Photolithography at 193nm", J. Vac. Sci. Technol. B, Vol. 10, No. 6, pp. 2989-2996, November/December 1992.
	Hosono, K., et al., "A Novel Architecture for High Speed Dual Image Generation of Pattern Data for Phase Shifting Reticle Inspection", SPIE - Integrated Circuit Metrology, Inspection, and Process Control VI, Vol. 1673, pp. 229-235 (1992).
	Lin, B.J., et al., "Single-Level Electric Testsites for Phase-Shifting Masks", SPIE, Vol. 1673, pp. 221-228, March 9-11, 1992.
	Brunner, T., "Rim Phase-Shift Mask Combined with Off-Axis Illumination: A Path to 0.5(lampda) / Numerical Aperture Geometries", Optical Engineering, Vol. 32, No. 10, pp. 2337-2343, October 1993.

EXAMINER:	Date Considered:	

PTO-1449

Atty. Docket No.

Serial No.

NTI-703CIP3

**Applicant** 

PANG, Linyong

**Filing Date** 

Group

2825

#### OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.) CITATION **EXAMINER'S** INITIALS Nistler, J., et al., "Phase Shift Mask Defect Printability Analysis", Proceedings Of The Microlithography Seminar INTERFACE '93, OCG Microelectronic Materials, Inc., pp. 11-28 (1993). Rieger, M., et al., "System for Lithography Proximity Compensation", Precim Company, Portland, Oregon, September 1993 (28 pages). Wiley, J., et al., "Device Yield and Reliability by Specification of Mask Defects", Solid State Technology, Vol. 36, No. 7, pp. 65-66, 70, 72, 74, 77, July 1993. Ohtsuka, H., et al., "Evaluation of Repair Phase and Size Tolerance for a Phase-Shift Mask", J. Vac. Sci. Technol. B, Vol. 11, No. 6, pp. 2665-2668, November/December 1993. Nistler, J., et al., "Large Area Optical Design Rule Checker for Logic PSM Application", SPIE, Photomask And X-Ray Mask Technology, Vol. 2254, pp. 78-92 (1994). Pati, Y.C., et al., "Phase-Shifting Masks for Microlithography: Automated Design and Mask Requirements", J. Opt. Soc. Am., Vol. 11, No. 9, pp. 2438-2452, September 1994. Spence, C., et al., "Automated Determination of CAD Layout Failures Through Focus: Experiment and Simulation", SPIE, Vol. 2197, pp. 302-313 (1994). Stirniman, J., et al., "Fast Proximity Correction with Zone Sampling", SPIE, Vol. 2197, pp. 294-301 (1994). Stirniman, J., et al., "Optimizing Proximity Correction for Wafer Fabrication Processes", SPIE, Photomask Technology And Management, Vol. 2322, pp. 239-246 (1994). Stirniman, J., et al., "Wafer Proximity Correction and Its Impact on Mask-Making", Bacus News, Vol. 10, Issue 1, pp. 1, 3-7, 10-12, January 1994. Qian, Q.D., et al., "A New Scalar Planewave Model for High NA Lithography Simulations", IEEE, pp. 45-48 (1994). Barouch, E., et al., "OPTIMASK: An OPC Algorithm for Chrome and Phase-Shift Mask Design", SPIE, Vo. 2440, pp. 192-206, February 1995. Karklin, L., "A Comprehensive Simulation Study of the Photomask Defects Printability", SPIE, Vol. 2621, pp. 490-504 (1995). Wiley, J., et al., "The Effect of Off-Axis Illumination on the Printability of Opaque and Transparent Reticle Defects", SPIE, Vol. 2512, pp. 432-440 (1995).

EXAMINER:	Date Considered:	
-----------	------------------	--

PTO-1449

Atty. Docket No.

Serial No.

NTI-703CIP3

**Applicant** 

PANG, Linyong

Filing Date

Group

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)			
EXAMINER'S INITIALS	CITATION		
	Reynolds, J., "Elusive Mask Defects: Reflectivity Variations", Solid State Technology, pp. 75-76, March 1995.		
	Brunner, T., et al., "Approximate Models for Resist Processing Effects", SPIE, Vol. 2726, pp. 198-207, March 1996.		
	Rieger, M., et al., "Customizing Proximity Correction for Process-Specific Objectives", SPIE, Vol. 2726, pp. 651-659 (1996).		
	Yen, A., et al., "Characterization and Correction of Optical Proximity Effects in Deep-Ultraviolet Lithography Using Behavior Modeling", J. Vac. Sci. Technol. B, Vol. 14, No. 6, pp. 4175-4178, November/December 1996.		
	Kusunose, H., et al., "Direct Phase-Shift Measurement with Transmitted Deep-UV Illumination", SPIE, Vol. 2793, pp. 251-260 (1996).		
	Chang, K., et al., "Accurate Modeling of Deep Submicron Interconnect Technology", TMA Times, Vol. IX, No. 3 (1997).		
	Gans, F., et al., "Printability and Repair Techniques for DUV Photomasks", SPIE, Proceedings Of The 17th Annual Symposium On Photomask Technology And Management, Vol. 3236, pp. 136-141 (1997).		
	Ibsen, K., et al., "Clear Field Reticle Defect Diposition for Advanced Sub-Half Micron Lithography", SPIE, Proceedings Of The 17th Annual Symposium On Photomask Technology And Management, Vol. 3236, pp. 124-135 (1997).		
	Ishiwata, N., et al., "Novel Alternating Phase Shift Mask with Improved Phase Accuracy", SPIE, Proceedings Of The 17th Annual Symposium On Photomask Technology And Management, Vol. 3236, pp. 243-249 (1997).		
	Morimoto, H., et al., "Next Generation Mask Strategy - Technologies are Ready for Mass Production of 256MDRAM?", SPIE, Vol. 3236, pp. 188-189 (1997).		
	Park, C., et al., "An Automatic Gate CD Control for a Full Chip Scale SRAM Device", SPIE, Vol. 3236, pp. 350-357 (1997).		
	Pati, Y.C., et al., "Exploiting Structure in Fast Aerial Image Computation for Integrated Circuit Patterns", IEEE Transactions On Semiconductor Manufacturing, Vol. 10, No. 1, pp. 62-74, February 1997.		
	Roman, B., et al., "Implications of Device Processing on Photomask CD Requirements", SPIE, Vol. 3236 (1997) (Abstract Only).		
	Vacca, A., et al., "100nm Defect Detection Using a Dynamically Programmable Image Processing Algorithm", SPIE, Vol. 3236 (1997) (Abstract Only).		

EXAMINER:	Date Considered:	

**PTO-1449** 

Atty. Docket No.

Serial No.

NTI-703CIP3

**Applicant** 

PANG, Linyong

Filing Date

Group

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)			
EXAMINER'S INITIALS	CITATION		
	Ausschnitt, C., et al., "Advanced DUV Photolithography in a Pilot Line Environment", IBM J. Res. Develop., Vol. 41, No. 1/2, pp. 21-37, January/March 1997.		
	Brunner, T., "Impact of Lens Aberrations on Optical Lithography", IBM J. Res. Develop., Vol. 41, No. 1/2, pp. 57-67, January/March 1997.		
	Hawryluk, A., et al., "EUV Lithography", Miicrolithography World, pp. 17-18 & 20-21, Summer 1997.		
	Holmes, S., et al., "Manufacturing with DUV Lithography", IBM J. Res. Develop., Vol. 41, No. 1/2, pp. 7-19, January/March 1997.		
	Rothschild, M., et al., "Lithography at a Wavelength of 193nm", IBM J. Res. Develop., Vol. 41, No. 1/2, pp. 49-55, January/March 1997.		
	Tsujimoto, E., et al., "Hierarchical Mask Data Design System (PROPHET) for Aerial Image Simulation, Automatic Phase-Shifter Placement, and Subpeak Overlap Checking", SPIE, Vol. 3096, pp. 163-172 (1997).		
	Schoenmaker, W., et al., "Theory and Implementation of a New Interpolation Method Based on Random Sampling", IMEC Technology Paper, pp. 1-35, 31 January 1997.		
	Kubota, H., et al., "A Fast Method of Simulating Resist Pattern Contours Based on Mean Inhibitor Concentration", Jpn. J. Appl. Phys., Vol. 37, pp. 5815-5820 (1998).		
	Vacca, A., et al., "100nm Defect Detection Using an Existing Image Acquisition System", SPIE, Vol. 3236, pp. 208-21 (1998).		
	Fukuda, H., et al., "Determination of High-Order Lens Aberration Using Phase/Amplitude Linear Algebra", J. Vac. Sci. Technol. B, Vol. 17, No. 6, pp. 3318-3321, November/December 1999.		
	Fukuda, H., "Node-Connection/Quantum Phase-Shifting Mask: Path to Below 0.3um Pitch, Proximity Effect Free, Random Interconnects and Memory Patterning", J. Vac. Sci. Technol. B, Vol. 17, No. 6, pp. 3291-3295, November/December 1999.		
٠,	Balasinski, A., et al., "A Novel Approach to Simulate the Effect of Optical Proximity on MOSFET Parametric Yield", IEEE, pp. 37.6.1-37.6.4 (1999).		
	Balasinski, A., et al., "Comparison of Mask Writing Tools and Mask Simulations for 0.16um Devices", IEEE, SEMI Advanced Semiconductor Manufacturing Conference, pp. 372-377 (1999).		

EXAMINER:	Date Considered:	